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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Richard O'Dell

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EXAMINER

LISTVOYB, GREGORY

ART UNIT

PAPER NUMBER

1796

MAIL DATE

DELIVERY MODE

08/15/2008

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/560,861	<b>Applicant(s)</b> O'DELL ET AL.	
	<b>Examiner</b> GREGORY LISTVOYB	<b>Art Unit</b> 1796	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 5/02/2008.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) 4 and 15-24 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3 and 5-14 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Election/Restrictions***

Applicant's election with traverse of conjugated polymer or oligomer in the reply filed on 1/02/2008 is acknowledged. The traversal is on the ground(s) that that a search and examination of the entire application would not place a serious burden on the Examiner. This is not found persuasive because in fact it places serious burden to the Examiner, since it requires addition search for particular process and method of use of the claimed polymer.

The requirement is still deemed proper and is therefore made FINAL.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

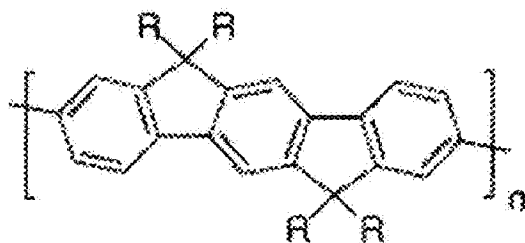
(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1- 3, 5, 8-12 rejected under 35 U.S.C. 103(a) as being unpatentable over Setayesh et al (Bridging the Gap between Polyfluorene and Ladder-Poly-p-phenylene:Synthesis and Characterization of Poly-2,8-indenofluorene, Macromolecules, 2000, 33, 2016-2020), herein Setayesh in combination with Reisch (Dissertation, Oligo- und Poly(indenofluorene)..., Mainz, 2000, pp. 27 and 115) and evidences by Kim (Assemblies of conjugated polymers. Intermolecular and intramolecular effects on the

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photophysical properties of conjugated polymers, Pure Appl. Chem., Vol. 74, No. 11, pp. 2031-2044, 2002) herein Kim.

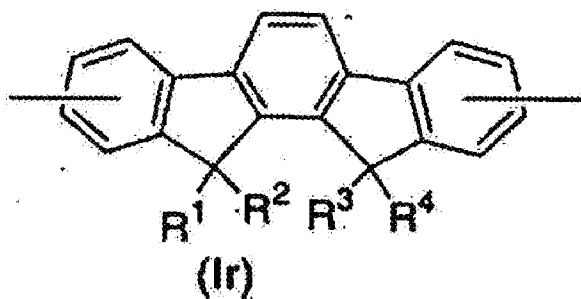
Setayesh discloses a Poly-2,8-indenofluorene of the following structure (8a) (see page 2017) (structure I):



**8 a:** R = octyl

**b:** R = ethylhexyl

which is trans isomer compare to cis- polyindenofluorene, claimed in Claim 1 (structure II):



Both Setayesh and the applicant use their polymers in light emitting devices.

In reference to Claims 9-12, Setayesh discloses a method of synthesis, identical to one of the Application examined (see reaction Scheme 2).

It is noted that the Applicant directly compares cis and trans structures in the Specification (see Table 1). The data from Table 1 reveal that there is no direct evidence that trans structures (Examples 6-9) have inferior performance compared to cis-structure (Example 5) in the following: CIE<sub>x</sub> (all the data are comparable), CIE<sub>y</sub> (Polymer 5 comparable with Polymer 7), Half life (trans Polymer 6 is better than Polymer 5), Color shift, Delta V and Burning (random data, not dependent on cis and trans isomers).

The starting monomer for polyindeno[1,2-b]fluorene is trans-indeno[1,2-b]fluorene (see Scheme 2), analogous to one claimed in Claims 8-10. However, cis-indeno[1,2-b]fluorene, used in the Application is also known in the art.

Reisch uses cis-indeno[1,2-b]fluorene for preparing family of polymers for light emitting devices (see page 27 and 115).

Kim evidences that introducing of cis linkages in conjugated polymers used in light emitting devices leads to high emission yield (see page 2040).

Therefore, it would have been obvious to a person of ordinary skills in the art to use Reisch's cis-indeno[1,2-b]fluorene monomer as a starting material in Setayesh's synthesis in order to achieve high emission yield.

Claims 6-7 and 13-14 rejected under 35 USC 103(a) as being unpatentable over Setayesh in combination with Reisch and Inbasekaran (US 5777070) and evidences by Kim.

Setayesh discloses a Poly-2,8-indeno[1,2-b]fluorenes for light emitting diodes (see discussion above) based on trans poly indeno[1,2-b]fluorenes.

Reisch teaches cis- indenofluorenes monomers used as a starting material for light emitting diodes.

Both Setayesh and Reisch fail to disclose a second repeat unit in their polymers.

Inbasekaran teaches a conjugated polymer for light emitting diodes (see Column 8, line 20) having conjugated 9, 9 di-n-octylfluorene and naphthalene units in its structure (see Example 3).

Inbasekaran teaches Halogen and Boron-based leaving groups (see Column 3, line 5 and Example 3) used together and Palladium catalyst used with a base (see Column 4, line 30 and Example 3). Note that Inbasekaran uses his polymerization system to produce copolymers. Setayesh, Inbasekaran and Application methods are obvious variants of classical Yamamoto's synthesis (admitted prior art, see Spec page 6).

As evidences by Kim, strong intermolecular interferences deteriorate emission properties of conjugated polymers (see page 2040). Introducing of bulky Naphthalene group decreases the above interaction, since it disturbing chain packing.

Therefore, it would have been obvious to a person of ordinary skills in the art to introduce bulky Naphthalene group to modified Setayesh's polymer in order to enhance emission properties of conjugated polymer.

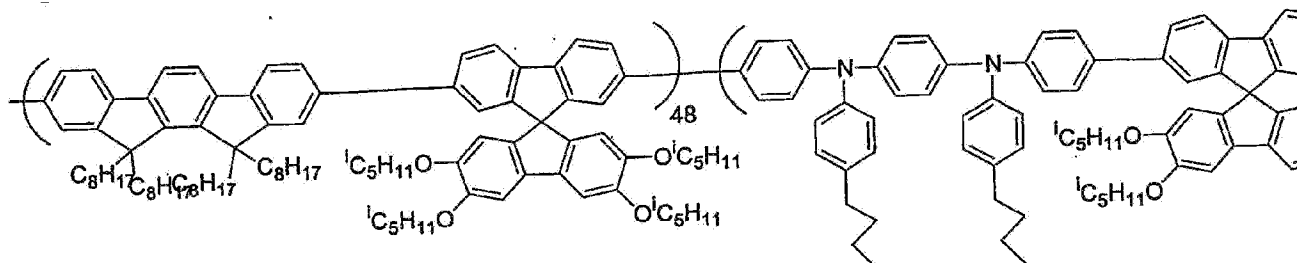
Claim 4 drawn to non-elected invention, since it contains non-elected species.

### ***Response to Arguments***

Applicant's arguments filed on 5/02/2008 have been fully considered but they are not persuasive.

Applicant argues that cis-indenofluorene has advantages over trans-indenofluorene. Applicant states that "The two polymers in the applicant's specification are directly comparable, i.e. polymers 5 and 6, because both have the same monomers. The only difference is that in example 5, the cis-indenofluorene is used whereas in example 6 the trans-indenofluorene is used (see the applicant's specification at page 19, lines 1-3.

Examiner disagrees. The statement above does not commensurate with the scope of the Claim 1 as it written. The Claim 1 claims an oligomer and polymer comprising Structure II above. the actual polymer has the following structure (Structure III),



which contains complex fragments of different nature.

In opposite, Setayesh teaches homopolymer of Structure I. Therefore, comparison of Setayesh's and Applicant's polymers are not correct. The variations in properties in polymers, which shown by the Applicant, can be derived from differences in interaction between the components of structure III. In order to show unexpected results Applicant should compare his compound with one of closest prior art (see 37SFR 1.132).

Any differences between the claimed invention and the prior art may be expected to result in some differences in properties. The issue is whether the properties differ to such an extent that the difference is really unexpected. *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986) (see also MPEP 716.02).

Regarding Reisch, Applicant argues that the reference suggests that cis-indenofluorenes links into macromolecule via the five-membered rings, whereas the indenofluorene repeating units of the inventive polymer are linked together via the terminal phenylene groups of the indenofluorene.

Examiner disagrees. Reisch cited in the Rejection solely for the purposes of showing that cis-indenofluorene structure is not novel, since it is known in Prior Art.

### **Conclusion**



**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to GREGORY LISTVOYB whose telephone number is (571)272-6105. The examiner can normally be reached on 10am-7pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vasu Jagannathan can be reached on 571-272-1119. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Rabon Sergent/  
Primary Examiner, Art Unit 1796

GL